
Next-generation Expeditionary Warfare Intelligent Training (NEW-IT) Program

Summary Booklet

7 October 2009

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14. ABSTRACT The Capable Manpower Future Naval Capability, Next-generation Expeditionary Warfare Intelligent Training (NEW-IT; N00014-08-C-0186) program is a 3-year contract (FY08-FY11) sponsored by the Office of Naval Research. NEW-IT supports US Marine Corps (USMC) training by delivering adaptive, intelligent, and dynamic improvements to scenario-based instructional simulation. This document was developed for the NEW-IT internal program review, held on 7 October 2009 in Orlando, FL. The booklet summarizes the purpose and conceptual design of the NEW-IT effort, and it summarizes latest impact assessment results.					
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The logo for NEWit features the word "NEW" in a bold, black, sans-serif font, followed by "it" in a blue, italicized, sans-serif font. To the left of "NEW" is a stylized circuit board graphic with blue dots and lines. Above the "i" in "it" is a small black silhouette of an aircraft, with several thin lines radiating from it towards the letters.

NEWit

NEXT GENERATION EXPEDITIONARY WARFARE INTELLIGENT TRAINING



Next-generation Expeditionary Warfare Intelligent Training (NEW-IT) program summary booklet

7 October 2009, Internal program review meeting, Orlando, FL

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NEW-IT Program Details at a Glance

Contract: N00014-08-C-0186

Duration: Three-year contract (FY08-FY11)

Program Manager: Dr. Roy Stripling

Sponsor: Office of Naval Research (ONR), Capable Manpower Future Naval Capability (FNC)

Transition: The NEW-IT program has established a formal Technology Transition Agreement (TTA), Level A, with ONR, the USMC Program Manager for Training Systems (PMTRASYS), and the USMC Training and Education Command (TECOM). The Level-A TTA was signed June 2009. NEW-IT products will transition to the Marine Corps Ground Combat Supporting Arms System, a family of training systems including the Deployable Virtual Training Environment (DVTE).

Naval S&T Focus Areas Addressed:

- Asymmetric and Irregular Warfare (AIW)
- Distributed Operations (DO)
- Naval Warrior Performance and Protection

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This booklet was produced by the Applied Cognition and Training in Immersive Virtual Environments Laboratory at the University of Central Florida, Orlando. The publication's primary purpose is to facilitate communication and coordination of the Next-generation Expeditionary Warfare Intelligent Training (NEW-IT) program. This work is supported by the Office of Naval Research Grant N0001408C0186. The views and conclusions contained in this document are those of the authors and should not be interpreted as representing the official policies, either expressed or implied, of the ONR or the US Government. The US Government is authorized to reproduce and distribute reprints for Government purposes notwithstanding any copyright notation hereon.

Introduction to NEW-IT

The Capable Manpower Future Naval Capability, Next-generation Expeditionary Warfare Intelligent Training (NEW-IT; N00014-08-C-0186) program is a 3-year contract (FY08-FY11) sponsored by the Office of Naval Research. NEW-IT supports US Marine Corps (USMC) training by delivering adaptive, intelligent, and dynamic instructional support solutions to enhance productive training time, particularly training focused on the development of higher-order cognitive skills. Prototype products developed under NEW-IT are being integrated with USMC's Deployable Virtual Training Environment (DVTE), a multi-user laptop-based simulation suite fielded world-wide by the Marine Corps.

Specifically, NEW-IT will deliver a software prototype Instructional Support System (ISS) driven by empirically-evaluated instructional theories and methodologies. Additionally, NEW-IT will identify metrics and then measure the effectiveness of the ISS as compared to baseline data collection during initial product testing. These efforts will advance the state of the science via theory development, empirical investigation, and validation testing. Although developmental testing and experimentation will be primarily conducted within the DVTE Combined Arms Network (CAN), NEW-IT products will be generalizable across the range of the DVTE applications, including Virtual BattleSpace 2 (VBS2), and to other current and future simulation-based training platforms.

DEPLOYABLE VIRTUAL TRAINING ENVIRONMENT

The Deployable Virtual Training Environment (DVTE) is a laptop-based simulation system that provides a variety of small unit leader simulation-based training and educational training support for the Marine Air Ground Task Force (MAGTF). DVTE includes several unique simulations such as the Combined Arms Network (CAN) and Virtual BattleSpace 2 (VBS2), and each system can be reconfigured to simulate a variety of USMC platforms including the M1 Abrams, Amphibious Assault Vehicle (AAV), LAV-25, AV-8 Harrier II, and the AH-1 Cobra. DVTE systems consist of laptops bundled into sets of 32 computers, along with all of the associated peripherals. (Marine Reserve units receive half-sized DVTE bundles.) See Figure 1.



Figure 1. Marines use the DVTE CAN simulation

NEW-IT TECHNOLOGY DEVELOPMENT STRATEGY

NEW-IT is managed through a dual-tracked research and development approach. The first track involves the **development of prototype capabilities** within a testbed that can be used to produce periodic interim products for testing and transition. Components are considered for this path once the science reaches Technology Readiness Level (TRL) 4. The second track comprises **experimental exploration** of optimized instructional principles and algorithms for intelligent training capabilities, and it is designed to facilitate the progression of capabilities from TRL 3-4; this effort will produce iteratively-developed written specifications that inform prototype capabilities.

What's the Gap?

NEW-IT efforts are designed to address immediate Marine Corps needs as well as scientific gaps.

USMC SCIENCE AND TECHNOLOGY OBJECTIVES

NEW-IT addresses the following Marine Corps Science and Technology Objectives (STOs). These STOs were identified in the *Marine Corps Science and Technology Strategic Plan*, which establishes the priorities and directions for science and technology investment for the Marines. The following STOs can be found in the Human Performance Training and Education (HPT&E) section of the *Strategic Plan*:

USMC HPT&E STO-1: Warfighter Cognition

Develop tools, systems and training environments/domains which inculcate and reinforce cognitive and kinetic skills necessary to fight on the battlefields of the future.

USMC HPT&E STO-4: Warrior Technology Training

Develop flexible, adaptive training technologies that permit Marines to understand the nomenclature, operation, functioning, and tactical employment of new information technologies.

USMC HPT&E STO-6: Experiential Learning Technologies and Pedagogy

Develop tools and technologies to enable Marines to train the way they fight. This includes engaging the senses in realistic, challenging, and rapidly reconfigurable scenarios that allow both training and mission rehearsal.

USMC HPT&E STO-8: Automated Performance Assessment

Develop technologies which allow a user to semi-autonomously create tailored training scenarios based on selected training standards from which the performance is automatically evaluated based on the provided metrics and results are exported to a Marine wide learning management system.

HPT&E Vision

The S&T investment in Human Performance Training and Education (HPT&E) is intended to enhance future Marine Corps capabilities by developing technical solutions which seek to close human performance gaps utilizing training and education technologies as well as physiological and nutritional solutions. The desired end state is improved technology enablers to prepare Marines to win on the battlefield of the future. Specifically, these technologies shall address the mandates of DoD Training Transformation (T2) to develop Joint integration of live, virtual, and constructive training events. (From the *MC S&T Strategic Plan*, A-1).

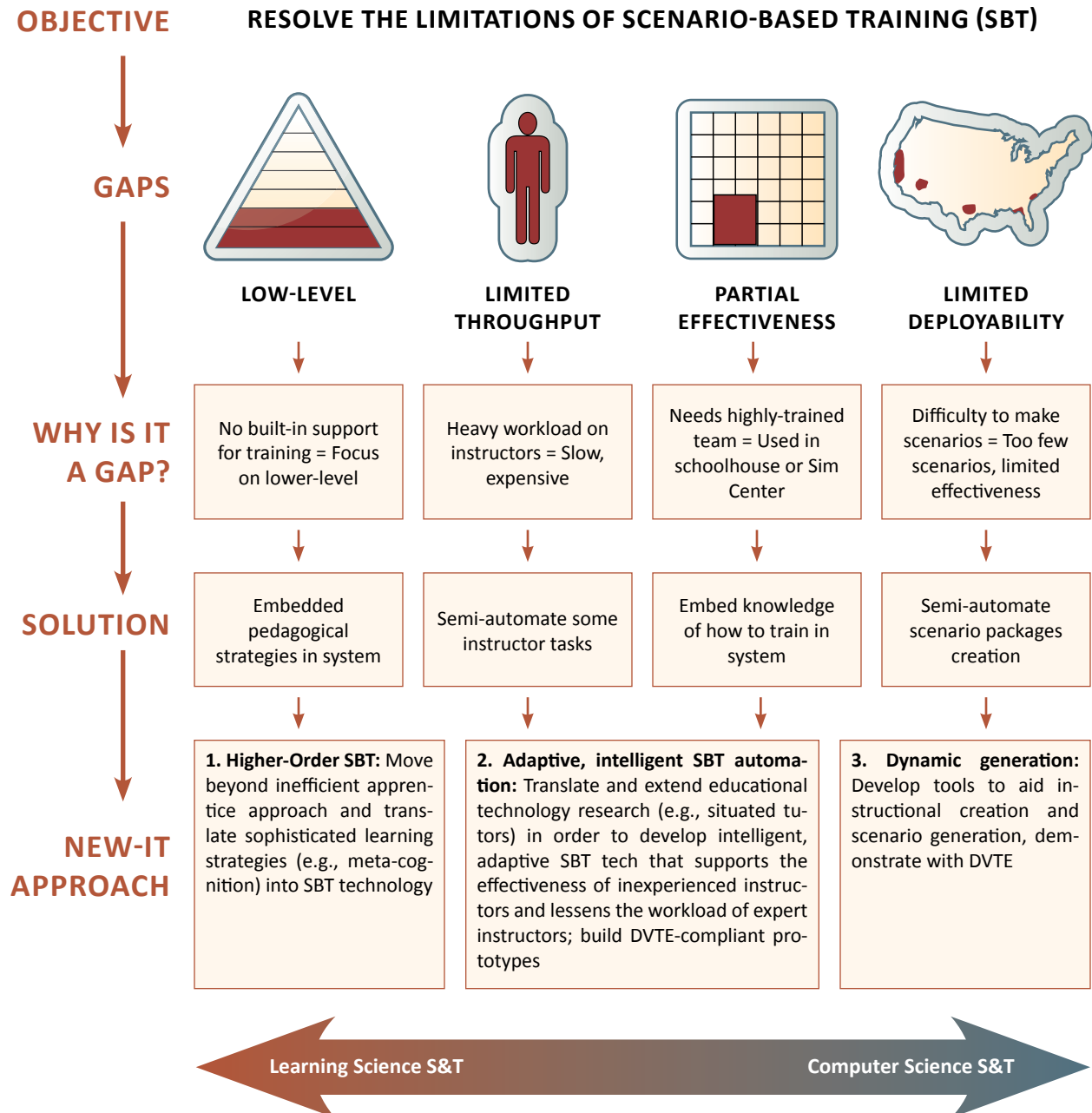
ACADEMIC SCIENCE AND TECHNOLOGY CHALLENGES

In recent years there has been a shift in the armed forces, pushing responsibilities for situational awareness, decision making, and other such higher-orders cognitive skills down to small unit levels. Under this paradigm, battlefield dominance is achieved through dispersed, but coordinated, interdependent tactical small teams. To be effective, contemporary warfighters must not only be fully-trained in their operational procedures but they must also be competent with more challenging higher-order knowledge, skills, and attitudes (KSAs).

Scenario-based training (SBT) is an instructional approach ideally suited to support optimal transfer-of-training for higher-order KSAs in complex domains (e.g., Salas & Cannon-Bowers, 2000; Oser et al., 1999; Oser et al., 1997). However, SBT suffers from two practical limitations. First, it offers poor

SCIENCE AND TECHNOLOGY CHALLENGES

Learning and computer science gaps that coincide with the USMC STOs have also been identified. The below graphic depicts the logical progression, from the ultimate academic objective down to the specific NEW-IT Science and Technology (S&T) approaches.



The NEW-IT S&T approach comprises a blend of **learning science** and **computer science**.

Figure 2. NEW-IT Science and Technology (S&T) breakdown

return-on-investment. SBT is expensive, time-consuming, and requires extensive involvement from military instructors. Second, to be effective SBT systems must include extensive scenario libraries in order to adequately cover the range of possible mission contexts. In practice, this critical requirement is never satisfied.

One way to address these issues is to provide automation; as Parasuraman and Riley (1997) remark in their classic article, “in modern times, humans are consumers of automation.” Thus, significant effort is being devoted to the development of automated instructional components, such as adaptive training technology and dynamic scenario generators.

While automation may address some of the pragmatic issues, there also remains a challenge to possibly enhance the effectiveness of Enhanced Operations training. While SBT is effective for training complex tasks and sophisticated KSAs, it could potentially be improved by integrating additional learning science principles into its training cycle. Thus, significant effort is also being devoted to the investigation of guided-practice focused instructional strategies and delivery methods that can supplement traditional SBT.

We hypothesize that the culmination of these efforts will lead to more effective and efficient SBT, which in turn will better facilitate the training of the knowledge, skills, and attitudes required for Enhanced Operations. Figure 2 depicts a breakdown of the NEW-IT S&T rationale and approach.

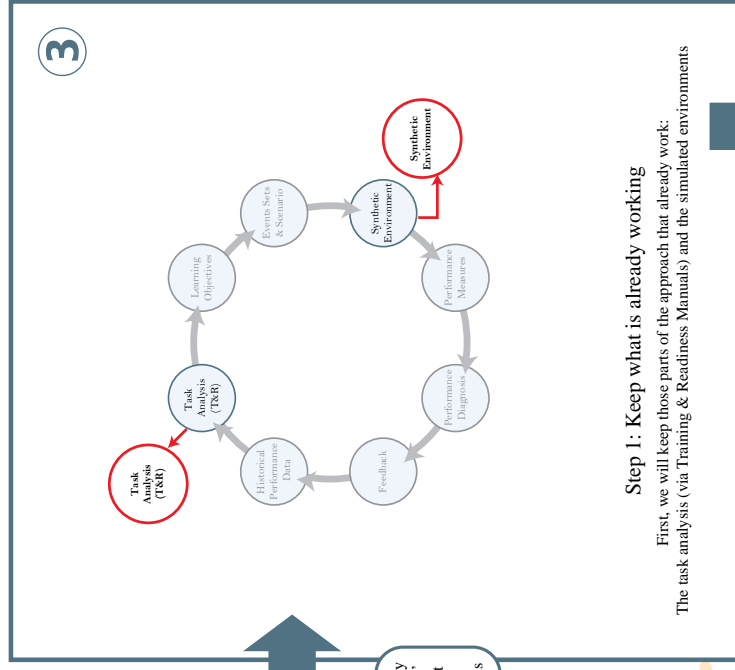
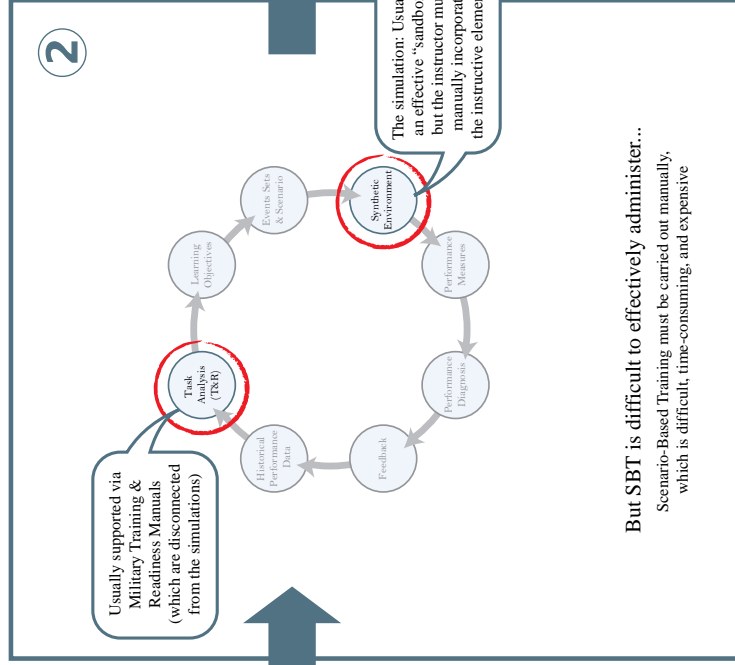
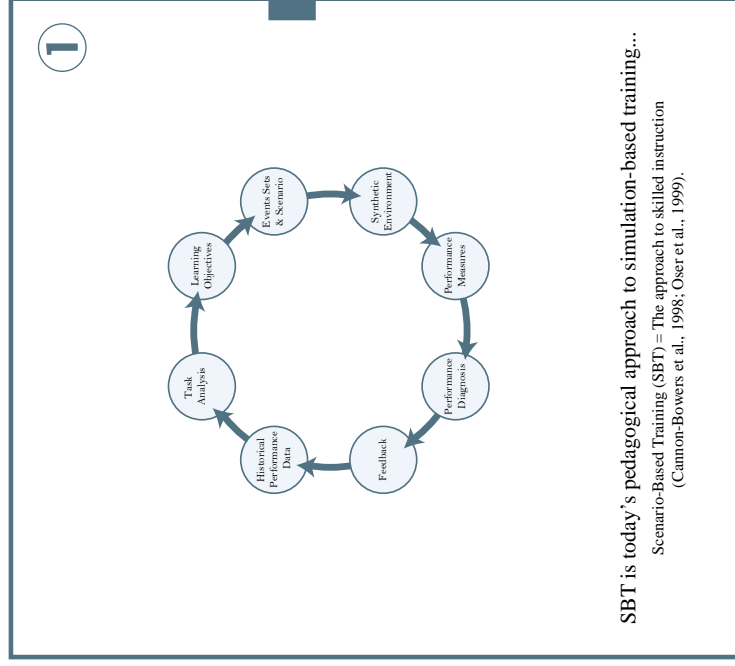
NEW-IT Conceptual Design: SBT-AID

SCENARIO-BASED TRAINING: ADAPTIVE, INTELLIGENT, DYNAMIC

The organizing concept for NEW-IT S&T is “SBT-AID,” which stands for **Scenario-Based Training: Adaptive, Intelligent, Dynamic**. The SBT-AID approach combines intelligent tutoring components, scenario-based instructional simulations, dynamic scenario generation capabilities, content authoring support, and an integrated pedagogical framework.

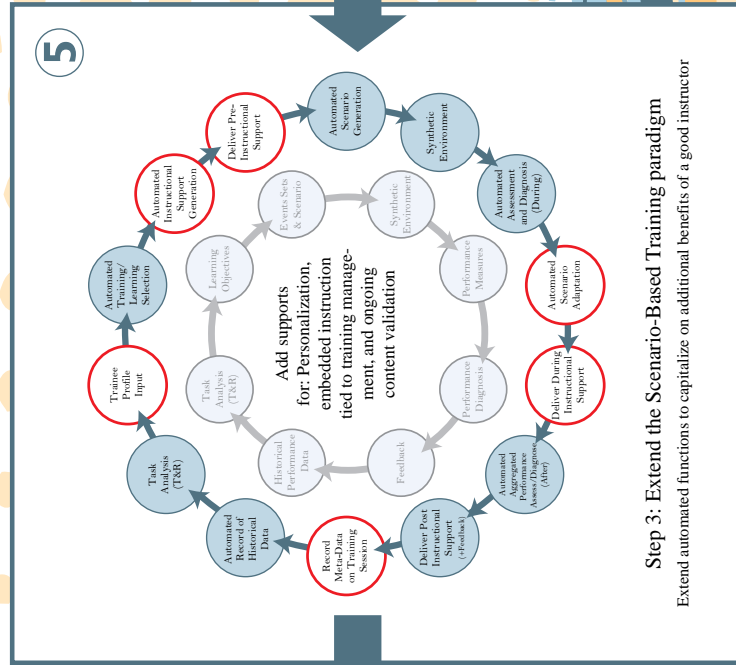
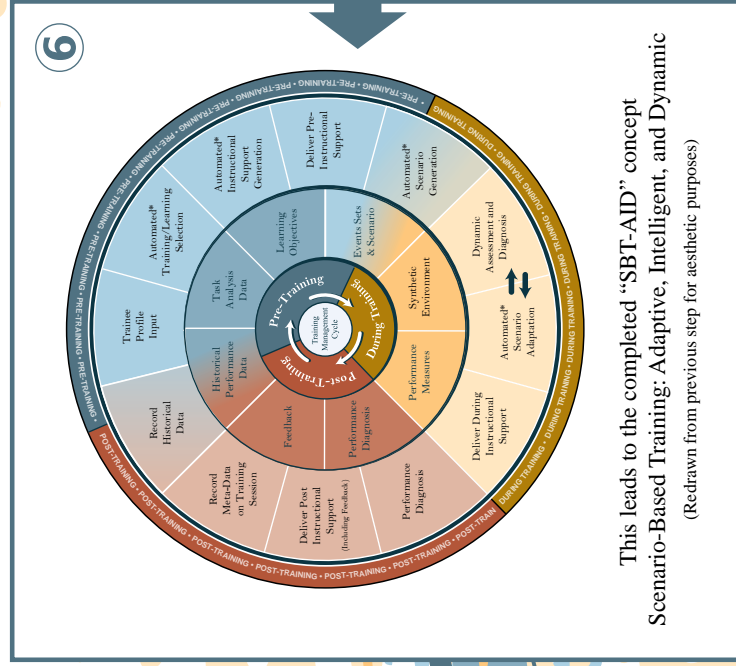
SBT-AID is an extension of the well-accepted scenario-based approach to training proposed by Cannon-Bowers et al. (1998) and Oser et al. (1999). The standard SBT paradigm specifies eight steps: (1) Conduct task analysis, (2) Select training objectives, (3) Develop event sets and scenarios, (4) Select a training environment, (5) Select and apply an instructional strategy, (6) Conduct performance assessment, (7) Deliver feedback, and (8) Record trainees’ performance history. These steps are carried out almost entirely by the instructional staff with little-to-no support from the training system. This places a heavy workload on instructors and necessitates that instructional staffs include not only subject-matter experts but also instructional design and technology experts.

The SBT-AID approach extends the standard SBT paradigm by automating instructor tasks, extending support for content generation, and integrating lessons-learned from intelligent tutoring research. More specifically, the “AID” acronym refers to the embedded Adaptive training technology, Intelligent system and trainee assessment approaches, and Dynamic generation of scenario content. The fourteen steps of the SBT-AID model are as follows: (1) Conduct task analysis, (2) Build or access trainee profiles, (3) Select training objectives, (4) Select and apply an instructional strategy, (5) Deliver pre-task instruction, (6) Generate a relevant training scenario, (7) Deliver the scenario via a virtual simulation (synthetic environment), (8) Assess and diagnose process performance, (9) Adapt the training scenario, (10) Deliver during-execution extrinsic feedback, (11) Assess and diagnose outcome performance, (12) Deliver post-task instruction (e.g., after-action review), (13) Record meta-data on training session, and (14) Record trainees’ performance history. Figure 3 shows the rational of how SBT transforms into SBT-AID.



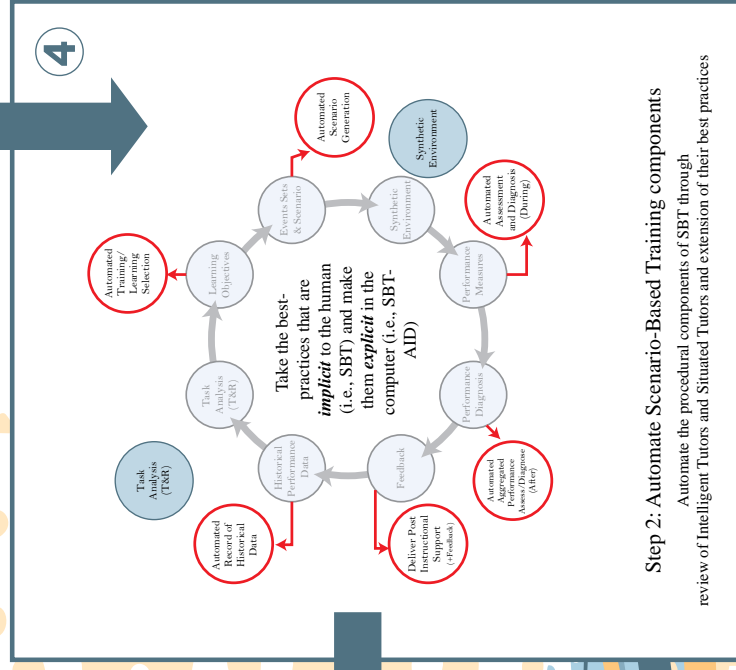
Step 1: Keep what is already working

First, we will keep those parts of the approach that already work: The task analysis (via Training & Readiness Manuals) and the simulated environments



Step 3: Extend the Scenario-Based Training paradigm

Extend automated functions to capitalize on additional benefits of a good instructor



Step 2: Automate Scenario-Based Training components

Automate the procedural components of SBT through review of Intelligent Tutors and Situated Tutors and extension of their best practices

Figure 3. Progression from traditional SBT to SBT-AID

Instructional Support System

SBT-AID is the organizing concept for NEW-IT. It provides a framework within which the scientific exploration takes place; it also translates into a high-level architectural design for the NEW-IT Instructional Support System (ISS). The ISS will integrate with DVTE, and it will incorporate the recommendations from the learning and computer science research teams.

ISS DESIGN & REQUIREMENTS PROCESS

In order to transform the SBT-AID concept and architecture into a functional prototype the NEW-IT team creates system design and requirements documents twice yearly. The requirements are derived from three sources: Marine Corps needs, academic lessons-learned, and science-based requirements. Our goal is to develop an effective SBT-AID system that delivers high return-on-investment. Thus, throughout the design process we have made choices that minimize development costs while still supporting effective training.

The Field Requirements sub-team has worked diligently with Marine Corps customers to elicit, analyze, and document ISS requirements and specifications, develop a need-functionality alignment matrix, and create design evaluation methods through user testing, subject-matter expert interviews, and questionnaires. Meanwhile the Science sub-teams have gathered lessons-learned from existing academic literature and developed experimental plans to extend the science. Figure 4 shows a high-level diagram of the ISS architecture; system requirements build-off of this simplified architectural design.

ISS PROTOTYPE DEVELOPMENT: ISS, TIPS, COGS, & DIVAARS

The Instructional Support System is the primary NEW-IT software prototype, and programmers from Lockheed Martin are leading its development. Meanwhile, secondary development efforts are also underway; these efforts are producing ISS components that will be federated with the final system. CHI Systems, Inc. is developing the TIPS lesson generator and the UCF Institute for Simulation and Training (IST) is developing the COGS scenario generator. Additionally, the DIVAARS after-action review system was developed, in part, by IST for the Army. This software is being leveraged and extended to work with the NEW-IT system.

Impact Assessment

NEW-IT's goal is to develop a holistic model for impact assessment that can be potentially generalized to other training systems as well as applied to the assessment of the ISS software. Towards this end, the NEW-IT team is conducting research in the science of impact assessment. The team is also conducting a two-pronged Training Effectiveness Evaluation, focusing on both **operational effectiveness** (i.e., immediate Marine Corps needs identified in the Technology Transition Agreement) and **instructional effectiveness** (i.e., longer-term goals identified by science and technology standards).

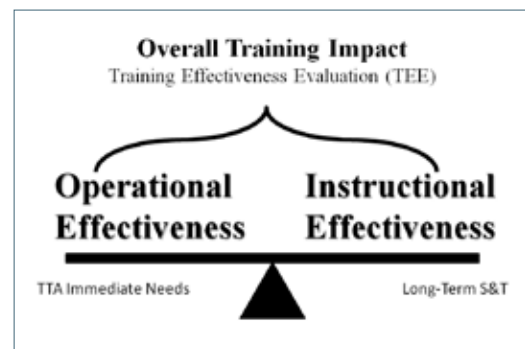


Figure 5. NEW-IT's impact assessment approach targets both operational and instructional effectiveness.

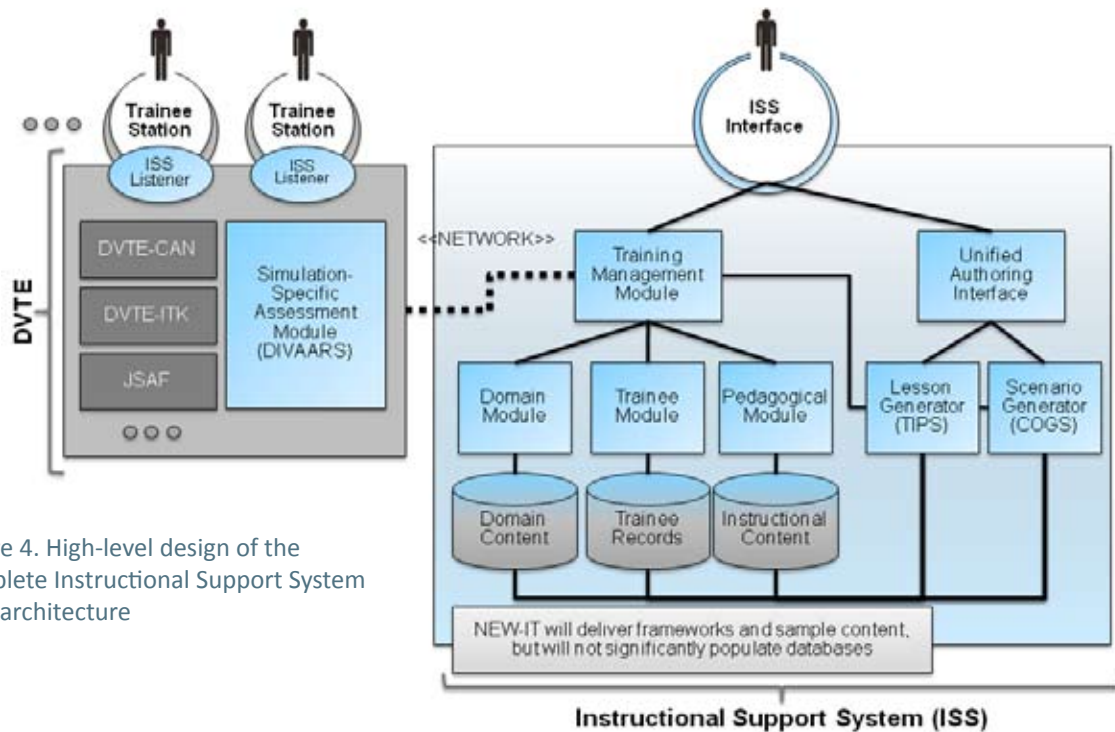


Figure 4. High-level design of the complete Instructional Support System (ISS) architecture

MODULE NAME	DESCRIPTION
Domain	The Domain Module facilitates input-output to the Domain Content Database, and it includes functions that select relevant domain-specific metrics (from the Domain Content Database) for a scenario during its construction.
Trainee	The Trainee Module facilitates input-output to the Trainee Records Database and performs operations on trainee records. Its major functions are to create runtime trainee profiles and to select appropriate stereotype profiles.
Pedagogical	The Pedagogical Module facilitates input-output to the Instructional Content Database, and it holds and applies rules for instructional interventions (e.g., when to deliver feedback).
Training Management	The Training Management Module serves as an internal "router" for the ISS. It (a) mediates the system's interactions with the instructors and trainees, and (b) governs the input/output and monitoring of the simulation.
Simulation-Specific Assessment (DIVAARS)	It is our assumption that many simulation systems will have organic assessment capabilities; however, DVTE-CAN lacks this capacity. Thus, we propose to leverage past work with DIVAARS to extend the capacity of DVTE-CAN to monitor within-simulation performance.
Lesson Generator (TIPS)	The Lesson Generator facilitates the (a) manual lesson editing/assembly, (b) manual IMI upload and editing, (c) automated lesson assembly, and (d) automated lesson selection.
Scenario Generator (COGS)	The Scenario Generator facilitates the (a) manual scenario assembly, (b) manual scenario editing, and (c) automatic scenario assembly.
ISS Listener	The ISS Listener facilitates communication and monitoring of the individual trainee DVTE stations.
DATABASES	
Domain Content	The Domain Content Database holds domain-specific data, including T&R Manuals (PDFs) and indexed T&R events from the manuals, a domain ontology, domain-specific IMI of all types, domain-specific scenarios, and premade (e.g., from the Lesson Generator) packages of IMI.
Trainee Records	The Trainee Records Database holds all trainee personal information, including individual identifiers (e.g., rank), traits (e.g., ratings of self-efficacy from a survey), and performance data (e.g., test or scenario past performance), as well as pass/fail data on the T&R events.
Instructional Content	The Instructional Content Database holds instructional content such as communication templates (e.g., feedback templates) and specific strategy heuristics.

OPERATIONAL EFFECTIVENESS

The operational effectiveness testing aims to measure the impact of the ISS software against immediate Marine Corps needs identified in the Technology Transition Agreement (TTA). See Table 1 for a summary of these metrics. Initial results from early Operational Effectiveness impact assessment testing have been very promising.

Objective 1: Enhance Facilitator Performance

Metric: Time to setup training operation (scenario)

The impact of the ISS was measured using five DVTE machines. Impact growth increases (percent in time reduction) considerably with more computers online (i.e., Academies and other settings, where exercises may use an entire suite [or more] of computers are expected to experience greater gains). The latest assessments have been conducted with Version 1.0 of the ISS. To date, 25% improvement has been found in this objective area when using ISS V1.0 versus using DVTE alone. See Figure 6.

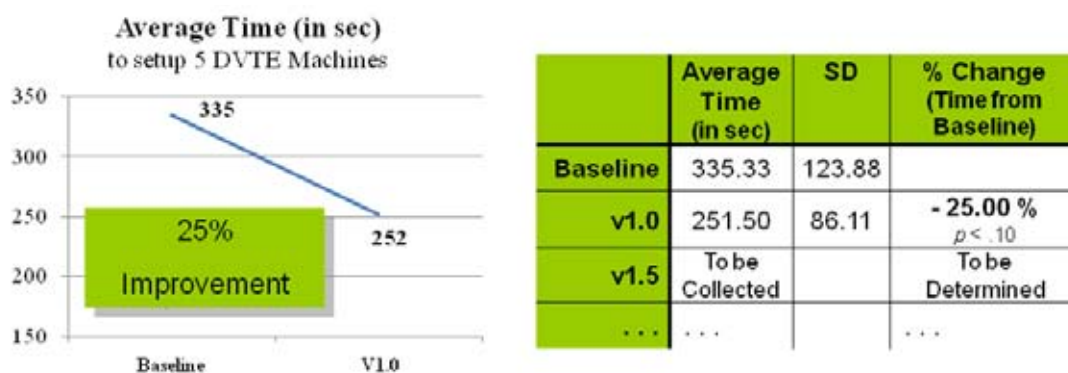


Figure 6. Operational Effectiveness Evaluation: Objective 1 results (as of 10/09)

Objective 2: Enhance instructional quality via links between training goals and curriculum

Metric: Selection of target scenario matching a training objective

The impact of the ISS was measured by assessing users' ability to identify training scenarios to meet T&R objectives based upon explicit linkages between scenarios and T&R manual elements/objectives. The latest assessments have been conducted with Version 1.0 of the ISS. To date, 71% improvement has been found in this objective area when using ISS V1.0 versus using DVTE alone. See Figure 7.

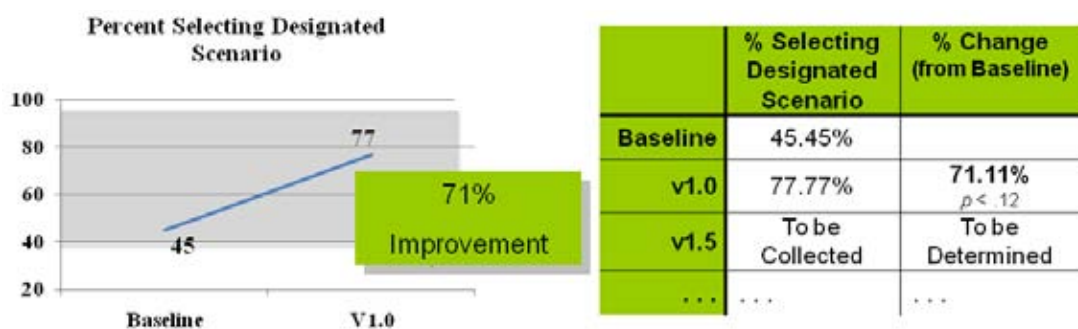


Figure 7. Operational Effectiveness Evaluation: Objective 2 results (as of 10/09)

AREA	TTA OBJECTIVE	CURRENT CAPABILITY	THRESHOLD	OBJECTIVE	ASSESSMENT APPROACH
Enhance facilitator performance	Decrease the time to setup a training operation	Lengthy unguided set-up for training operations	30% decrease in the time to setup a training operation	50% reduction in the time to setup a training operation	Field study comparing current DVTE CAN to DVTE CAN with ISS 1.0, 2.0 and 2.5
Enhance instructional quality via links between training goals (i.e. T&R events) and curriculum	Ability to identify training scenarios to meet T&R objectives based upon explicit linkages between scenarios and T&R manual elements/objectives	No automated capability in DVTE	80% of users are able to identify a scenario that matches targeted T&R objectives	Fully link NEW-IT ISS capabilities within DVTE-CAN Expand NEW-IT ISS capabilities beyond DVTE-CAN	Field study comparing current DVTE CAN to DVTE CAN with ISS 1.0, 2.0 and 2.5

Table 1. Operational Effectiveness metrics identified in the NEW-IT TTA

INSTRUCTIONAL EFFECTIVENESS

The instructional effectiveness testing aims to measure the impact of the ISS software on instructors and trainees. The NEW-IT team has developed the following effects model that depicts the outcome variables we intend to measure as well as their theorized relationships (see Figure 8). To test this model we have devised a series of four ablative studies, along with a summative, comprehensive concluding study. The first two experiments examine theoretical foundations of the **domain ontology** and **instructional strategies**. The third and fourth experiments evaluate the effectiveness of **COGS** and **TIPS**, the two software systems that incorporate the aforementioned theoretical bases. Finally, the **summative evaluation** will attempt to measure a substantial portion of the below effects model through a classic 1X2 experimental design.

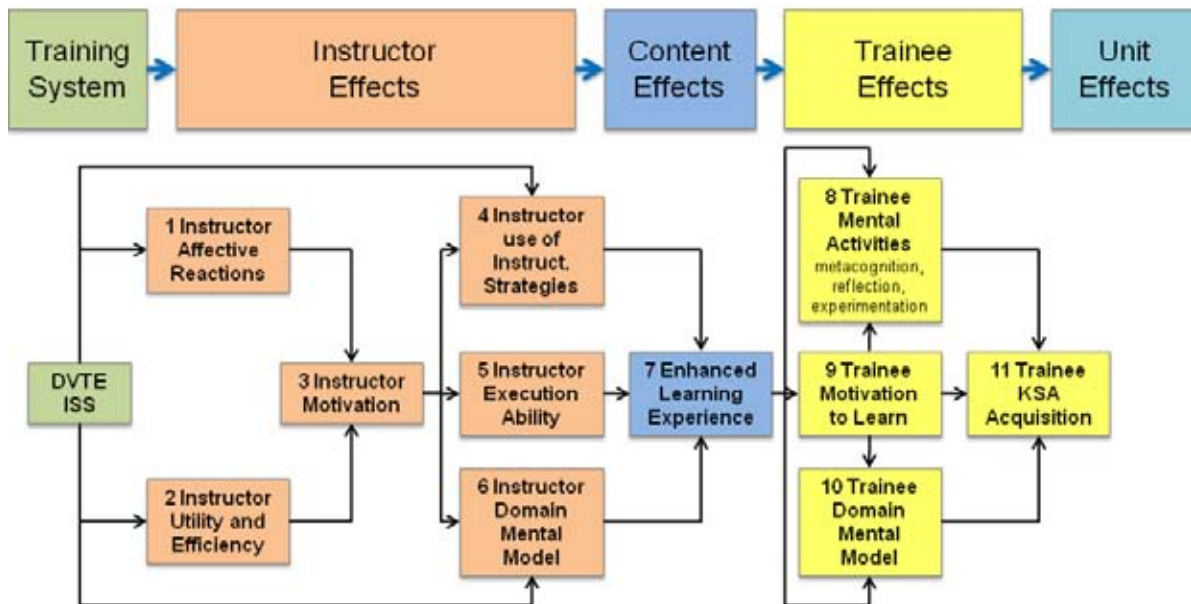


Figure 8. Instructional Effectiveness Effects Model

NEW-IT Presentations and Publications

CONFERENCE PAPERS

- Nicholson, D. (2009). Developing adaptive, intelligent scenarios to support enhanced operations training. Session presented at the 2009 Military Modeling and Simulation Symposium (MMS'09), San Diego, CA, March 22-27, 2009.
- Schatz, S. & Bowers, C. (2009, March). Defining the critical components of a scenario to support higher-order KSA training. In Denise Nicholson (Chair) Developing adaptive, intelligent scenarios to support enhanced operations training. Session presented at the 2009 Military Modeling and Simulation Symposium (MMS'09), San Diego, CA, March 22-27, 2009.
- Fowlkes, J., Norman, J. & Schatz, S. (2009, March). Making the most of practice: Enhancing scenario-based training with adaptive instructional strategies. In Denise Nicholson (Chair) Developing adaptive, intelligent scenarios to support enhanced operations training. Session presented at the 2009 Military Modeling and Simulation Symposium (MMS'09), San Diego, CA, March 22-27, 2009.
- Zachary, W. (2009, March). Narrative story structures as an alternative to scenarios for adaptive training in teamwork and other soft skills. In Denise Nicholson (Chair) Developing adaptive, intelligent scenarios to support enhanced operations training. Session presented at the 2009 Military Modeling and Simulation Symposium (MMS'09), San Diego, CA, March 22-27, 2009.
- Nicholson, N., Fiore, S. Vogel-Walcutt, J. J., & Schatz, S. (2009). Advancing the science of training in simulation-based training [Session Abstract]. Proceedings of the 53rd Annual Conference of the Human Factors and Ergonomics Society. Santa Monica, CA: Human Factors and Ergonomics Society.
- Fowlkes, J., Norman, J. W., Schatz, S., & Stagl, K. C. (2009). Contrasting cases: A strategy for advanced learning using simulation-based training. Proceedings of the 53rd Annual Conference of the Human Factors and Ergonomics Society. Santa Monica, CA: Human Factors and Ergonomics Society.
- Vogel-Walcutt, J. J., Fiore, S., Bowers, C., & Nicholson, N. (2009). Contrasting cases: A strategy for advanced learning using simulation-based training. Proceedings of the 53rd Annual Conference of the Human Factors and Ergonomics Society. Santa Monica, CA: Human Factors and Ergonomics Society.
- Schatz, S., Bowers, C.A., & Nicholson, D. (2009). Advanced situated tutors: Design, philosophy, and a review of existing systems. Proceedings of the 53rd Annual Conference of the Human Factors and Ergonomics Society. Santa Monica, CA: Human Factors and Ergonomics Society.
- Martin, G., Schatz, S., Bowers, C.A., Hughes, C. E., Fowlkes, J. & Nicholson, D. (2009). Automatic scenario generation through procedural modeling for scenario-based training. Proceedings of the 53rd Annual Conference of the Human Factors and Ergonomics Society. Santa Monica, CA: Human Factors and Ergonomics Society.
- Kotnour, T., Stanney, K., Landaeta, R., Milham, L., Drexler, J. & Nicholson, D. (2009). Developing Impact Assessment for Training Systems Research & Development: A Case Study of the Strategic Approach for the NEWIT System. Proceedings of the 53rd Annual Conference of the Human Factors and Ergonomics Society. Santa Monica, CA: Human Factors and Ergonomics Society.
- Schatz, S., Bowers, C. A., & Nicholson, D. (2009, March). Conceptual and architectural design process of an SBT-AID training system. Poster presented at the 18th Annual Conference on Behavior Representation in Modeling and Simulation (BRIMS), Sundance, UT, March 31-April 2, 2009.

DISSERTATION MATERIALS

- Martin, G. M. (2008). Automatic Scenario Generation of Entity Placement using Analysis of After Action Review. Doctoral dissertation proposal, University of Central Florida.

INVITED PRESENTATIONS

- Schatz, S., Bowers, C. A., & Nicholson, D. (2009, March). Scenario-Based Training Overview. Invited address presented at the FITE JCTD Working Group Meeting (Non-Referred), Camp Pendleton Marine Corps Base, CA, March 31-April 2, 2009.
- Schatz, S., Bowers, C. A., & Nicholson, D. (2009, May). Scenario-Based Training Overview. (Encore Presentation). Invited address presented at the Naval Research Advisory Committee (NRAC) Meeting (Non-Referred), Office of Naval Research, Washington, DC, May 19-20, 2009.

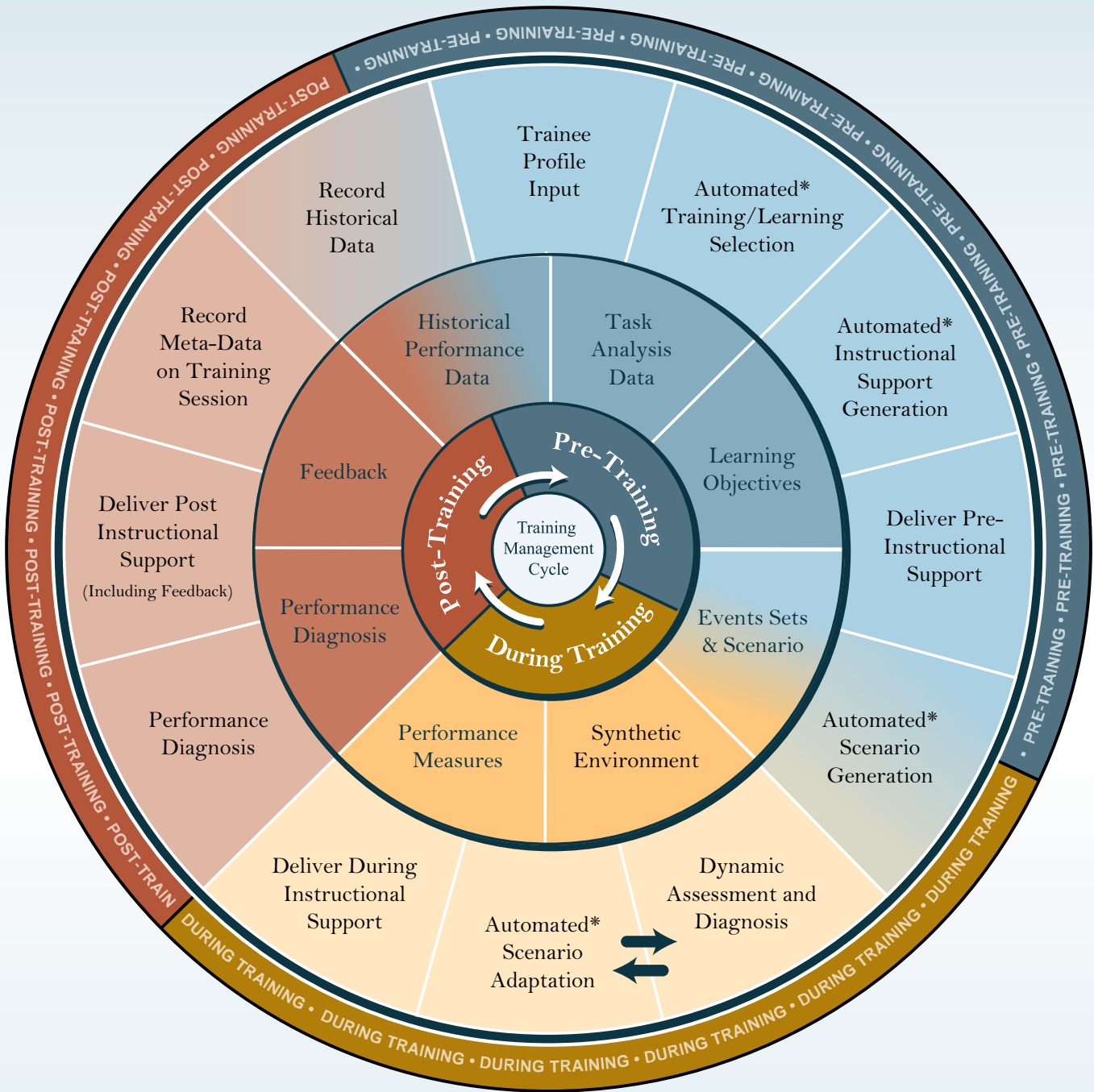
Right: Assorted NEW-IT products



BRIEF GLOSSARY

TERM	ACRONYM	DESCRIPTION
Adaptive	---	Adaptive systems tailor their functionality to specific individuals and/or groups of users. Adaptive instructional systems, such as the NEW-IT, ISS deliver individually-tailored training, which has demonstrated much greater effectiveness than non-adaptive instruction.
CAN-oriented Objective-based Generator of Scenarios	COGS	Software application that supports generation of scenarios for varying training objectives, using baselines and scenario vignettes.
Combined Arms Network	CAN	The CAN is a subset of the numerous training software packages within DVTE. The CAN includes a series of PC-based first person fire support training systems that support individual and FiST Supporting Arms Training.
Dismounted Infantry Virtual After Action Review System	DIVAARS	A product of the Army Research Institute for the Behavioral and Social Sciences (ARI) and the University of Central Florida Institute for Simulation and Training (IST), designed to facilitate AAR discussions and data analysis.
Domain Ontology	---	A relational mapping of the training and learning objectives for a specific subject domain. It is represented in both a human- and a machine-readable structure.
Instructional Support System	ISS	The primary prototype software system being developed under the NEW-IT contract. The ISS will comprise adaptive, intelligent instructional modules that will facilitate effective and efficient delivery of simulation-based training by providing automated support to instructors pre-, during-, and post-practice.
Intelligent Tutoring System	ITS	Computer-based learning system that uses artificial intelligence to adapt the training to individual users.
Interactive Multimedia Instruction	IMI	Interactive, electronically-delivered training and training support products including electronic publications, videos, PowerPoint projects, instructional software, and learning management systems.
Knowledge, Skills, and Attitudes	KSA	Knowledge is an understanding of declarative facts. Skills are the ability to apply knowledge to achieve a desired outcome. Attitudes refer to the way students approach their knowledge, skills, and the problems they will face.
Learning Objective	LO	An identified requirement for a warfighter to accomplish in order to reach fully-trained status. For our purposes, LOs are components of T&R events (which may be called TOs).
Mission Essential Task List	METL	METLs are derived from an organization's wartime missions and related tasks in external directives.
Scenario-Based Training	SBT	An instructional strategy used with simulation-based training that focuses on presenting realistic scenarios of real-world tasks.
Scenario-Based Training: Adaptive, Intelligent, Dynamic	SBT-AID	The NEW-IT conceptual framework. It expands on traditional scenario-based training by emphasizing opportunities for automation and adaptation throughout the traditional SBT cycle.
Training & Readiness Manual	T&R	T&R Manuals outline specific guidelines for planning, conducting and evaluating training, and assessing training readiness. T&R manuals are built around METLs and all events contained in a T&R manual relate directly to a specific METL.
Training Information Planning System	TIPS	Software application that supports authoring of pedagogically-sound training. TIPS includes a rich library of instructional strategies and usage advice.
Training Objective	TO	For our purposes, TOs are synonymous with the events in T&R manuals. One TO is comprised of multiple LOs.
Universal Joint Task List	UJTL	A comprehensive list of possible military tasks at the strategic, operational, and (joint) tactical levels of war.

Scenario-Based Training – Adaptive, Intelligent, Dynamic (SBT-AID)



* All automation can be optionally controlled or overwritten by the instructor

Scenario-Based Training: Adaptive, Intelligent, Dynamic (SBT-AID) is the conceptual basis for NEW-IT. SBT-AID extends the SBT paradigm by incorporating intelligent, adaptive automation; sophisticated embedded pedagogy; and dynamic scenario generation and adaptation into simulation systems.